

IN THE CLAIMS:

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1. (Currently Amended) A video indexing device configured for receiving a video scene having multiple frames and forming a descriptor that is configured for the representation, from a video indexing viewpoint, ~~of~~ motions of a camera or any kind of observer or observing device within any sequence of one or more frames of a video scene, said motions ~~being comprising~~ at least one ~~or several~~ of the following basic ~~operations~~ motion types: fixed, panning (horizontal rotation), tracking (horizontal transverse movement, also called traveling in the film language), tilting (vertical rotation), booming (vertical transverse movement), zooming (changes of the focal length), dollying (translation along the optical axis) and rolling (rotation around the optical axis), or any combination of at least two of these operations, wherein each of said motion types, except fixed, is oriented and subdivided into two components that stand for two different directions, and represented by means of ~~an~~ histogram having a dependent variable within which the values that each correspond to a respective predefined size of displacement.

2. (Currently Amended) ~~A descriptor according to~~ The device of claim 1, ~~wherein with which~~ each motion type, assumed to be independent, has its own speed described in an unified way by choosing a common unit to represent it.

3. (Currently Amended) The device of ~~A descriptor according to~~ claim 2, within which each motion type speed is represented by a pixel-displacement value working at the half-pixel accuracy.

4. (Currently Amended) ~~The device of A-descriptor according to claim 3,~~
~~within~~ which, in order to work with integer values, speeds are rounded to the closest half-
pixel value and multiplied by 2.

5. (Currently Amended) ~~The device of A-descriptor according to Claim 1,~~
wherein ~~the~~ description afforded by said descriptor is hierarchical, by means of a
representation of the motion handled at any temporal granularity.

6. (Currently Amended) ~~The device of A-descriptor according to claim 4,~~
wherein given a temporal window of the video data $[n_0, n_0 + N]$ (N is the total number of
frames of the window) and the speeds of each motion type for each frame, the number of
frames $N_{\text{motion_type}}$ in which each motion type has a significant speed is computed and the
temporal presence is represented by a percentage, defined as follows:

$$T_{\text{type of motion}} = N_{\text{type of motion}} / N$$

the temporal presence of all the possible motions being then represented by a
MotionTypesHistogram in which the values, between 0 and 100, correspond to a
percentage, the values being only 0 or 100, depending on the fact that the given
movement is present or not in the frame, when the window is reduced to a single frame.

7. (Currently Amended) ~~Application of a descriptor according to Claim 1,~~
~~wherein the implementation of an image retrieval system comprising a camera for the~~
~~acquisition of the video sequences, a video indexing device, a database, a graphical user~~
~~interface, for carrying out a requested retrieval from the database, and a video monitor for~~
~~displaying the retrieved information, the~~ an indexing operation within said video indexing
device being based on the categorization resulting from the use of said descriptor of claim
1 ~~camera motions.~~

8. (New) The device of claim 1, wherein the histogram has an independent variable with values configured to each correspond to a different one of said motion types.

9. (New) The device of claim 8, wherein the histogram is configured according to the equation:

$$T_{\text{type of motion}} = N_{\text{type of motion}} / N$$

wherein the subscript "type of motion" represents the independent variable, N represents the number of the frames that are within a window, and $N_{\text{type of motion}}$ represents the number of frames within the window that have the one of the motion types represented by said subscript.

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10. (New) A computer program product comprising a computer-readable medium having a computer program comprising a sequence of instructions for:

receiving a video scene having multiple frames; and

forming a descriptor that is configured to represent, from a video indexing viewpoint, motions of a camera or any kind of observer or observing device within any sequence of one or more frames of the video scene, said motions comprising at least one of the following basic motion types: fixed, panning (horizontal rotation), tracking (horizontal transverse movement, also called traveling in the film language), tilting (vertical rotation), booming (vertical transverse movement), zooming (changes of the focal length), dollying (translation along the optical axis) and rolling (rotation around the optical axis), or any combination of at least two of these operations, wherein each of said

motion types, except fixed, is oriented and subdivided into two components that stand for two different directions, and represented by means of a histogram having a dependent variable with values that each correspond to a respective predefined size of displacement.

11. (New) The product of claim 10, wherein the histogram has an independent variable with values configured to each correspond to a different one of said motion types.

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12. (New) The device of claim 11, wherein the histogram is configured according to the equation:

$$T_{\text{type of motion}} = N_{\text{type of motion}} / N$$

wherein the subscript "type of motion" represents the independent variable, N represents the number of the frames that are within a window, and $N_{\text{type of motion}}$ represents the number of frames within the window that have the one of the motion types represented by said subscript.
